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Ergot; A Perennial Issue?

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Canada

Claviceps purpurea (Fr.) Tul.

Often associated with the Middle Ages.

- “St. Anthony’s Fire”**
- “Sacer Ignis”**

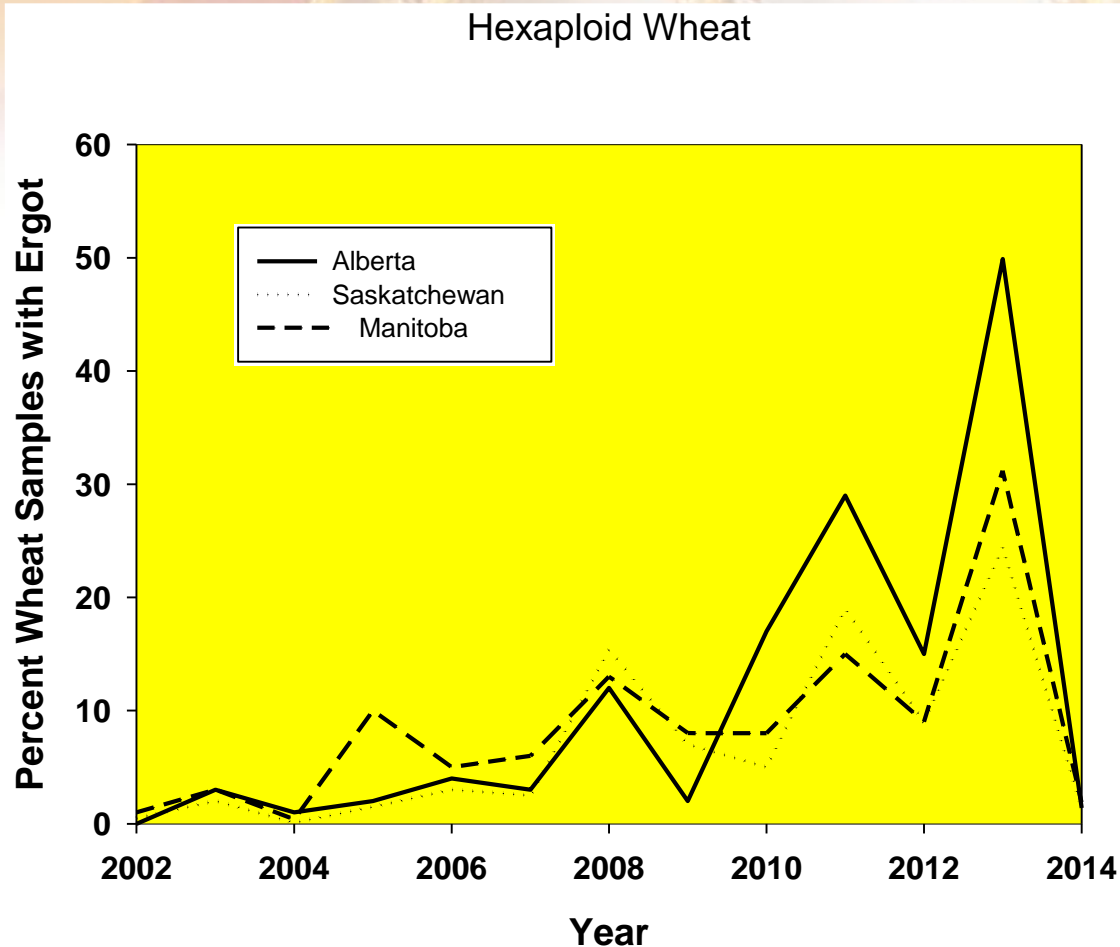
Sporadic but not causing major issues during late 20th century



Bailey et al. 2003, Diseases of Field Crops in Canada, 3rd Edition, CPS.

Ergot Incidence

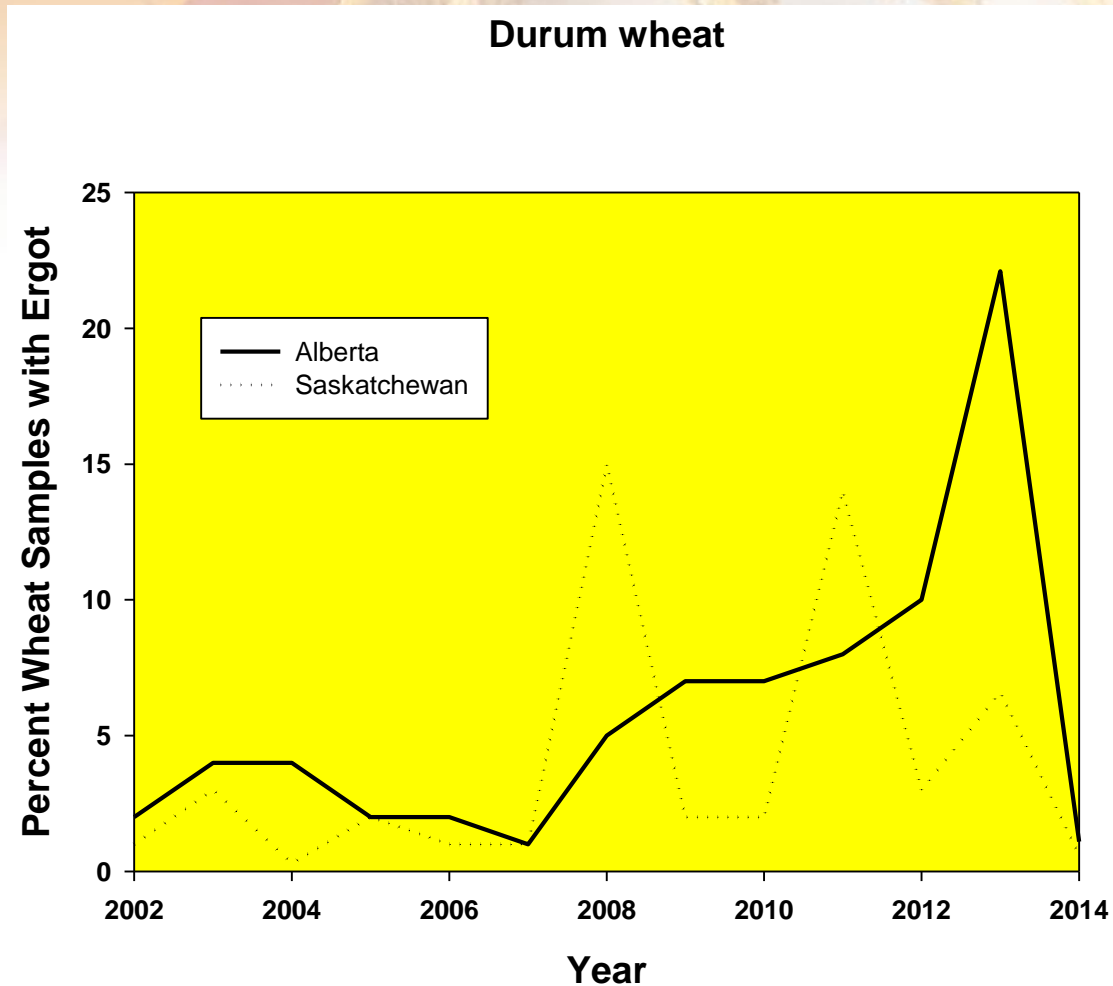
Hexaploid wheat



Data provided by the Canadian Grain Commission from their Harvest Survey Program.
www.grainscanada.gc.ca

Ergot Incidence

Durum wheat



Data provided by the Canadian Grain Commission from their Harvest Survey Program.
www.grainscanada.gc.ca

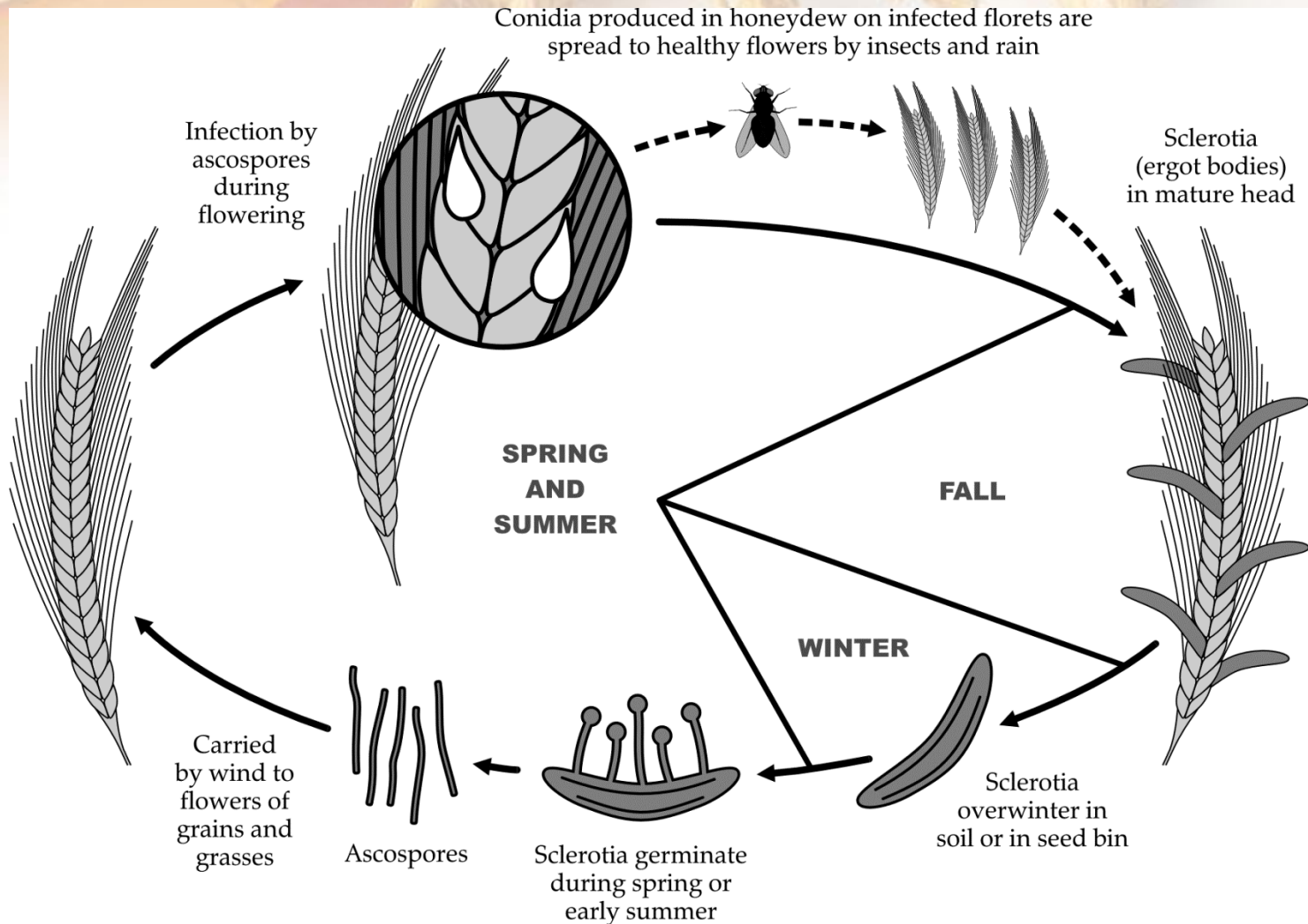
Effects of Ergot

- **Yield**
 - Replaces the Kernel, resulting in a reduction in yield
- **Presence of Ergot Bodies**
 - Toxic Alkaloids
 - Grade Loss or rejection at the elevator
- **Human food and animal feed issue**

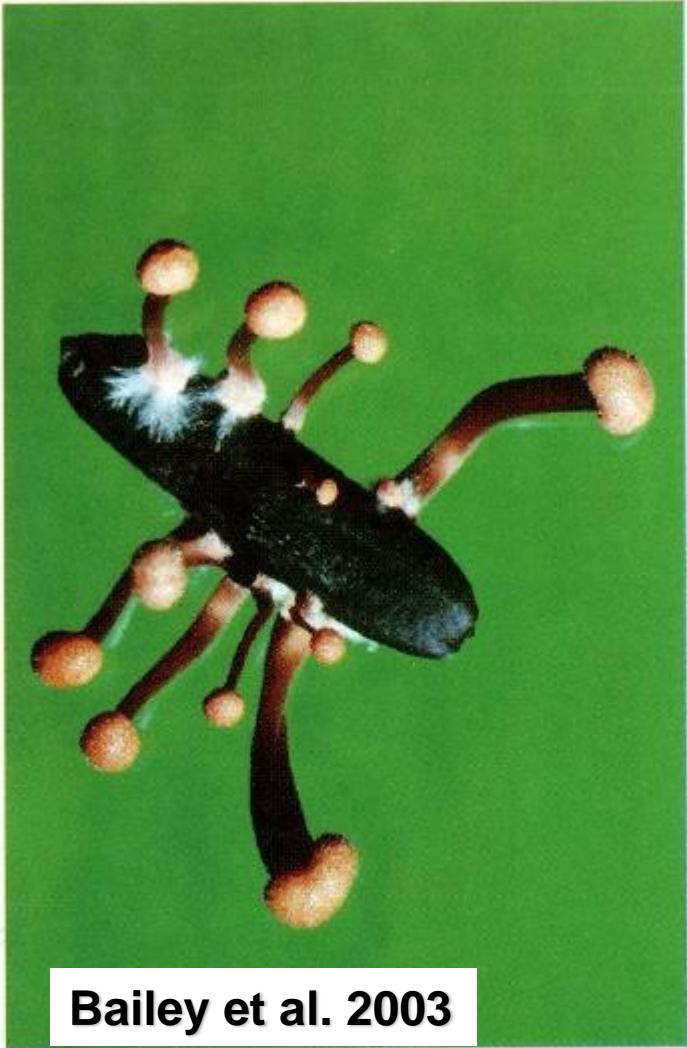
Prescott, J.M., P.A. Burnett, E.E. Saari et al. 1986. *Wheat Diseases and Pests: A Guide for Field Identification*. CIMMYT. Mexico, D.F., Mexico.



Ergot – Disease Cycle



Ergot Disease Cycle



Bailey et al. 2003



Grass Hosts



Honeydew



Bailey et al. 2003



Infected Host and Infested Grain



Management strategies: Overwintering phase of ergot

- **Sclerotia**
 - Survive for one year
- **Seed with no or low levels of ergot**
 - Certified Seed.
- **Reduce sclerotia**
 - Rotation
 - Avoid wheat after rye (or rye after wheat)
 - No wheat beside fall rye
 - Use of Proper Rotations (3 to 4 years)



Management strategies: Overwintering phase of ergot

- **Sclerotia**

- **Deep ploughing??**

- Bury to 5 cm depth

- **Fire??**

- **Mowing or spraying of grasses in headlands or ditches.**



Management strategies: Limit host infection



- **Grain floret infection**
 - **Limit factors related to pollen sterility**
 - Related to flower opening
 - Maintain balanced fertility (e.g. copper, boron)
 - Avoid late herbicide apps.
 - **Uniform stand**
 - Increase seeding rate and limit tiller development

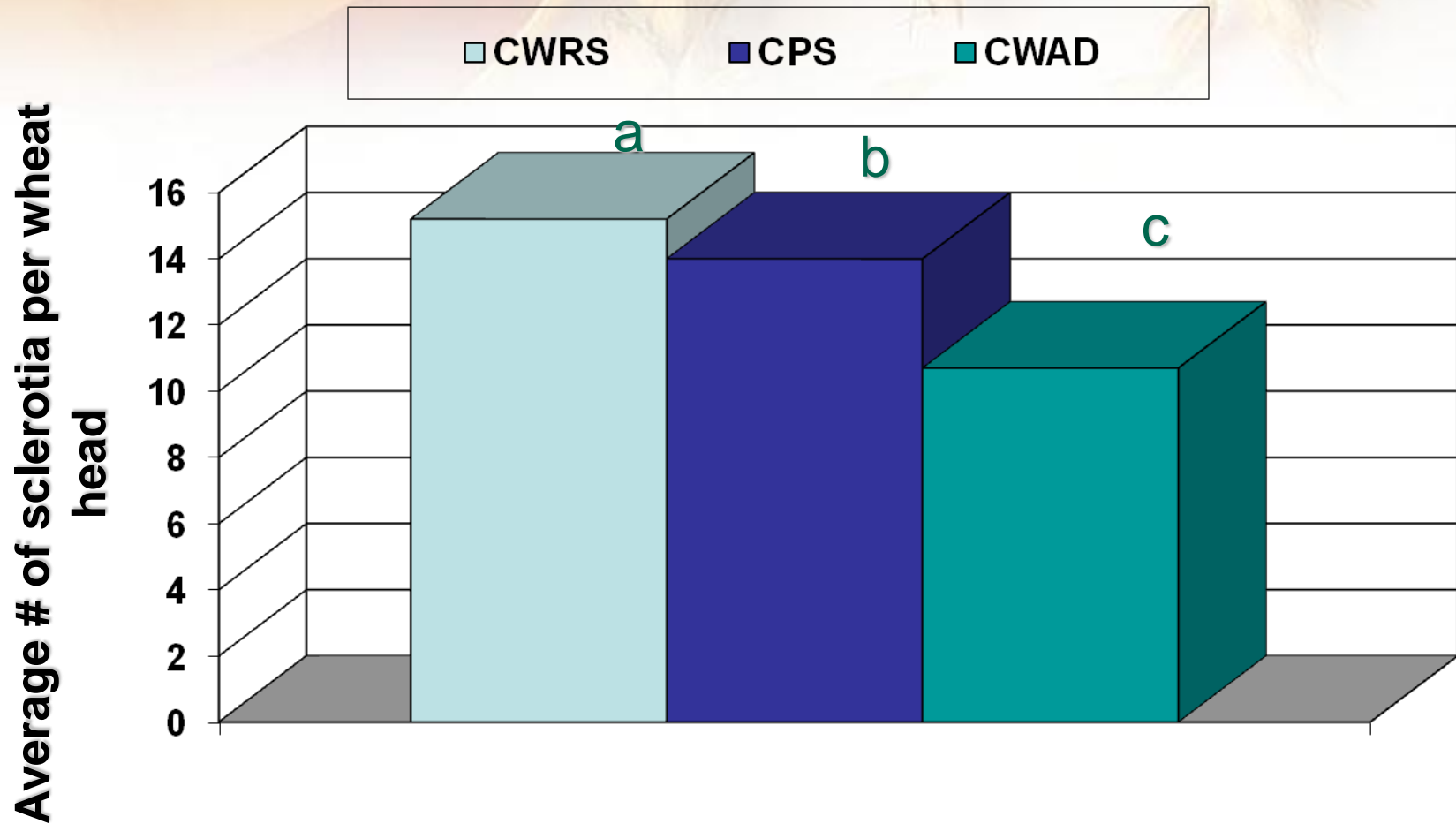


Management Strategies; Limit Host Infection

- **Crop Choice**
 - Winter vs. spring
 - Class of wheat?



Ergot reaction and wheat class



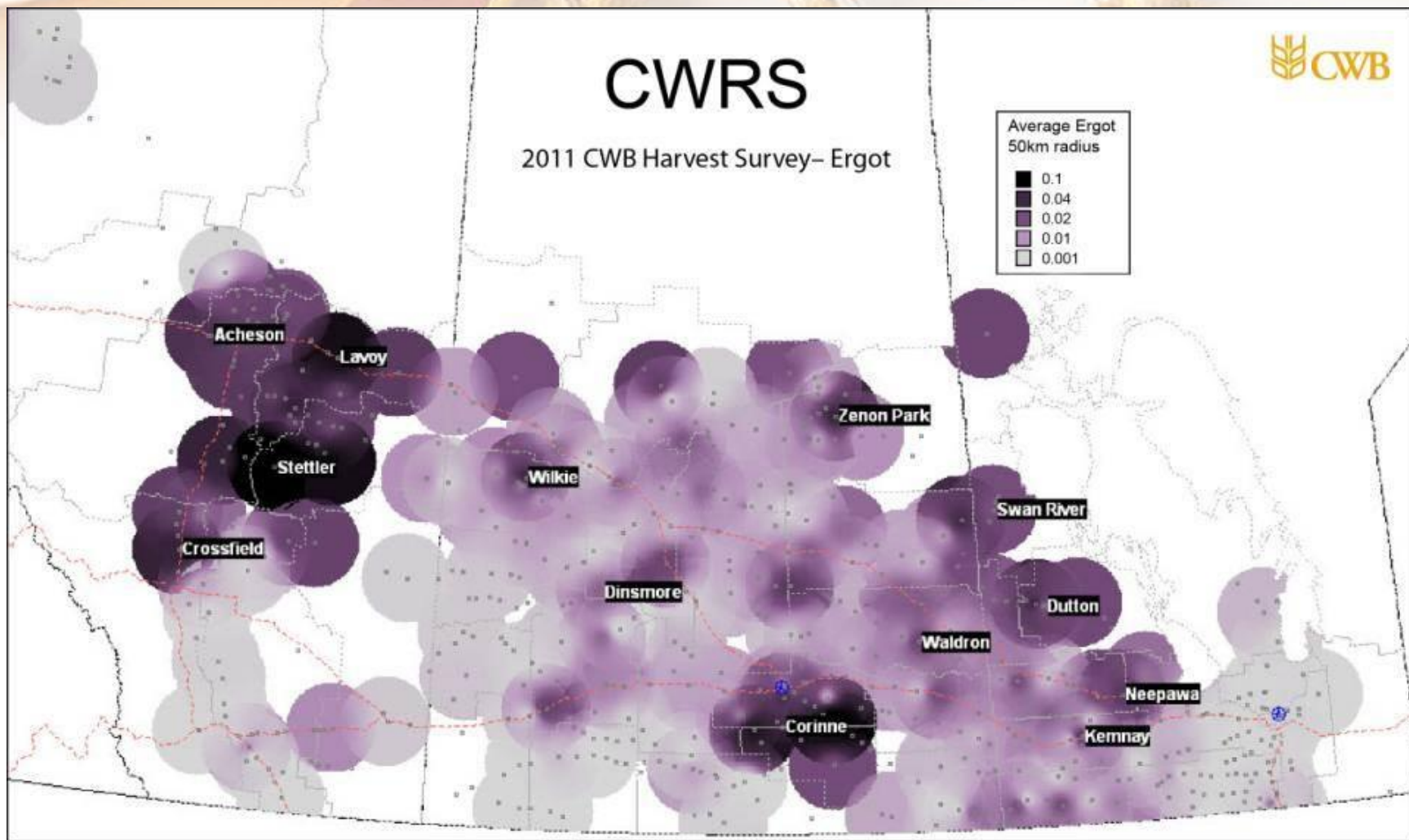
Management Strategies; Limit Host Infection

- **Crop Choice**
 - Winter vs. spring
 - Class of wheat?
 - Cultivar?



Ergot Distribution – 2011

Courtesy, Mike Grenier, Former CWB



Physiological Resistance to *Claviceps purpurea*; Does it Exist?

Easy Answer? Yes!

- **Rye**

- Sosulski and Bernier 1975

- **Barley**

- Pageau and Lajeunesse 2006, Oxley et al. 2009

- **Wheat**

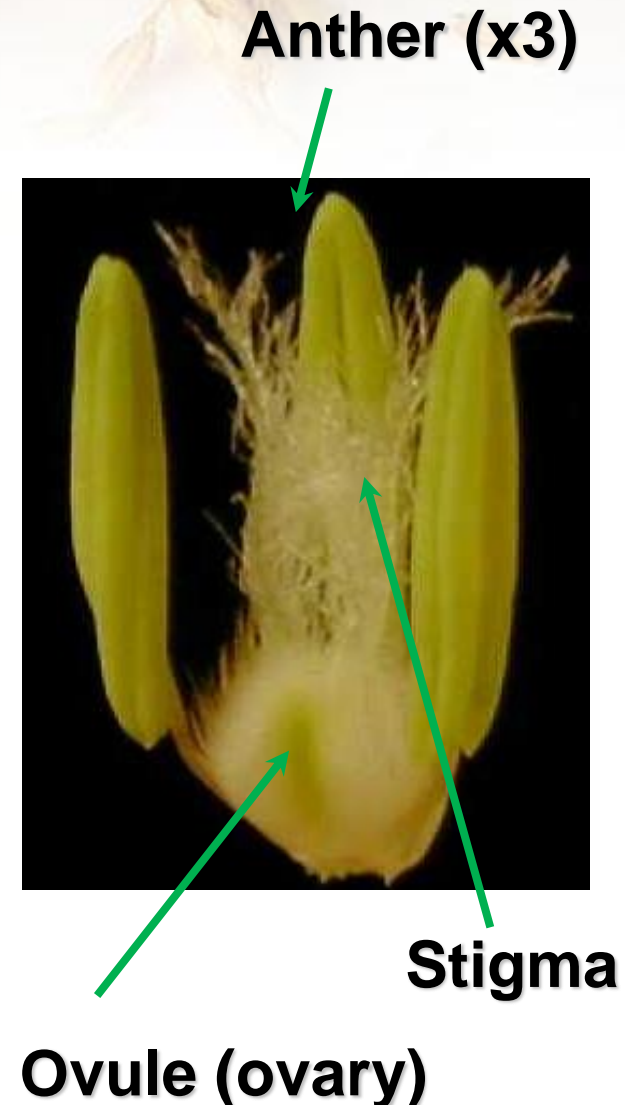
- Platford and Bernier 1970, 1976, Darlington and Mathre 1976, Coley-Smith and Watkinson 1987, Watkins and Littlefield 1976, Pageau et al. 1994, Menzies 2004, Bayles et al. 2009, Malo and Hucl, personal communication,

- Differences are not always great, but resistance is not a rare trait.
- Most lines with identified resistance are not commercially acceptable lines.

Management strategies: Limit infection



- **Foliar fungicide application**
 - Limit infection of cereal ovary tissues
 - European and US research
 - Recent UK studies suggest none of the fungicides used gave commercially acceptable levels of control in the field
 - Attributed to poor protection of cereal ovary tissue
 - » Limited uptake and movement of fungicides to ovary tissues
- **Research is ongoing**
 - Water volumes, etc.



Management strategies: Reducing ergot content of grain

- **Delay swathing/harvest**
 - Wind will blow off ergot bodies
- **Selective harvesting**
 - Headlands can be more affected
 - Harvest headlands separately
- **Grain cleaning**
 - Gravity table?
 - Colour sorters?





Acknowledgements

- **Soils and Crops 2015**
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Thank you - Merci





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